

Non-invasive discrimination of cell types by Raman Microscopy

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Cell-type discrimination is an important issue in the biological studies and biomedical applications. Along with the development of regenerative medicine, which is aiming at fabricating artificial tissues and organs for transplantation, there is an increasing demand for a non-invasive method to monitor the growing processes of different cell populations in the tissue and evaluate the quality of final tissue constructs. However, conventional methods generally require for disruption of the tissue transplants, such as tissue sectioning and immunostaining. A method which can discriminate and access different cell population in a label-free and non-destructive manner is necessary in this field.

Raman microscopy has emerged as a powerful tool in label-free observation and characterization of biological samples since it can detect vibrational frequencies given by chemical structure of the molecules. After simply shining the laser light onto the living specimens, cell and tissue-specific information can be recorded and analyzed. Non-destructive cells and tissue constructs can be used in the subsequent transplantation. In this research, cell maturation process was monitored and different cell populations were identified by Raman Microscopy. 3D observation illustrated the distribution of cellular components at different cell layers. Moreover, transitional state of cells was also detected before morphological change. This research suggests that Raman microscopy can be a powerful tool in evaluating the quality of cell products and tissue constructs in a label-free feature.

References:

- [1] Mao *et al.*, PNAS. 112(47): 14452-14459 (2015)
- [2] Ember *et al.*, NPJ Regen Med. 2:12 (2017)
- [3] Okada *et al.*, PNAS. 109(1): 28-32 (2012)
- [4] Palonpon *et al.*, Nat Protoc. 8(4): 677-692 (2013)